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# FEED AND HAY CROPS *for* FLORIDA LIVE STOCK

*A Supplement to*  
LIVE STOCK  
FARMING  
IN FLORIDA

*Published by* THE LAND AND  
INDUSTRIAL DEPARTMENT  
*of the* FLORIDA EAST COAST  
RAILWAY CO. (Flagler System)  
J. E. INGRAHAM, *Vice-President*  
Saint Augustine, Florida  
LOUIS LARSON, *Western Industrial Agent*  
109 West Adams Street, Chicago, Illinois

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J. E. INGRAHAM

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*Florida east coast railway company.*

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## *Publisher's Note*

*I*N a sense this booklet is a supplement to "Live Stock Farming in Florida," previously issued by this department, in which we dwelt upon different kinds of live stock and the possibilities offered by Florida to the live-stock farmer. Our treatise of feed and hay crops in "Live Stock Farming in Florida" made only brief mention of some important crops, hence this supplement.

*Like the previous booklet, the information herein contained has been carefully compiled and submitted to the best authorities in the state on the subjects embraced. In the revision, experiments were eliminated and the reader will find that no feed, hay or forage crops are recommended herein except those of proven merit.*

*This supplement, with the first booklet, completes a brief work on the live-stock industry in a state that offers opportunities for profit along that line that are at least not excelled by any other section in North America. We believe that the time is not far distant when Florida will rank among the leading states of the Union in the production of high-grade beef, pork and mutton.*



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## Preface

**M**AN'S most valued crop is grass. Grass is the essential to successful production of live stock. In a community, county or state that is successful in producing live stock will be found a class of industrious, well-to-do farmers. On cheap land with cheap labor a low-grade quality of live stock is generally found. On high-priced land with high-priced labor (which is generally more efficient) there is usually a high-grade quality of live stock.

So long as we produce low-grade forage and pasture crops, just so long will we continue to produce a low-grade quality of live stock. On the other hand, when we begin to produce forage and pasture crops that require more and careful cultivation, we will then be compelled to keep a better grade of live stock—or change our vocation.

The production of forage and pasture crops is essential to the successful production of live stock, and live stock is an important factor in maintaining and increasing the value of our soils. Therefore, forage and pasture crops, live stock and soil fertility are closely related.



# FEED *and* HAY CROPS *for* FLORIDA LIVE STOCK

## Bermuda Grass

**B**ERMUDA grass is well known in most parts of Florida. Perhaps we have no other grass that has been subjected to such severe criticism. Through all this criticism it has continued to grow and furnish an abundance of feed for our cattle, hogs and sheep. After abusing this, our best pasture grass, for a number of years, farmers and stockmen are just now beginning to realize its value. There is no denying that grass is the best and cheapest feed that we can give our live stock. A country without grass means a country with little or no live stock. Wherever we find an abundance of nutritious grass, we find the best cattle, horses, hogs, sheep and swine.

Bermuda grass is a persistent grower. It does well on a variety of soils and furnishes good pasturage from early spring to late fall. To get the best results, Bermuda grass should receive liberal applications of fertilizer, and be given some cultivation. Since this grass reproduces by underground stems, as well as by seed, some have thought that eradication would be impossible. However, by adopting a proper plan this grass may be destroyed and other crops grown upon the same area. The grower, however, should confine his plantings of this grass largely to areas which are to be used for permanent pasture.

## How to Plant

Either roots or seed may be used. In either case a good seed-bed should be prepared. Sow the seed broadcast and cover by the use of light harrow or weeder. If roots or pieces of sod be used, lay off the rows about three feet apart, drop in small pieces of the roots every eighteen inches or two feet, and cover by throwing the furrow back.

JOHN M. SCOTT,  
Florida Agricultural Experiment Station,  
Gainesville, Florida.

## Rhodes Grass

**R**HODES grass, a newly introduced species, is a native of central and southern Africa, where it is regarded as one of the best species for pastures on dry soils. It is a perennial, growing from 3 to 4 feet high, with a large number of very long, narrow, and tender leaves and with rather few branching stems.

When grown from seed its growth is commonly erect the first season, but when grown from roots, or the second season when grown from seed, it makes runnerlike branches 2 to 4 feet long, which root at the joints and so cover the ground quite rapidly.

It is propagated by both seed and roots. When seed is used it should be sown at corn-planting time at the rate of about 10 pounds per acre on a soil having a fine mellow surface, and then given a light harrowing. As the seed is produced only in small quantities and as it continues to be developed and matured through the entire season, little of it can be gathered at any one time; consequently the grass is more commonly propagated by roots. The roots may be planted on well-prepared land at any time from February to July, putting them 2 to 4 feet apart and protecting them from grazing until they become well established.

While the principal value of the grass is for grazing it is also used for hay, giving two or three cuttings of about one ton each per acre. The hay is of excellent quality. It bears severe drought and moderate frost without injury, but is easily killed by plowing late in the season.—*Extract from Bulletin No. 509, U. S. Department of Agriculture.*

## Para Grass

PARA grass may be called a dual-purpose grass, as it will furnish both good pasture and hay. As a pasture grass it will be found best suited to a rather moist soil. Even on this grade of soil, it should receive liberal applications of fertilizer if maximum growth is wanted. Para grass is not as resistant to cold as Bermuda grass. In the northern section of Florida, Para grass is almost too tender to stand the winters; but through the south central and southern parts of the state, it will be found to be one of our best pasture and hay crops. Through the central part of Florida where it is used solely for pasturage, it will perhaps be found advisable to plow it under in December. This will protect the stems from freezing, and also tend to renew the stand and make a better pasture for the coming year. Para grass resembles Bermuda somewhat in its habit of growth. When growth begins in the spring, runners from ten to twenty feet in length are sent out in all directions from the nodes. When the ground is fairly covered with runners, upright shoots grow from each node from two to three feet in height. Para differs, however, from Bermuda in that the runners are all produced above the surface of the ground, while the Bermuda grass produces its runners underneath the surface.

The yield of hay that may be obtained from Para grass will depend somewhat upon the character of the soil, and on the amount of fertilizer used. However, a yield of from one to four tons is not too much to expect on the best land. We have no data as to the amount of pasturage that this grass will stand, but under favorable condi-

tions from one to two acres should be sufficient to pasture an animal through the season. The yield of hay obtained from Para grass for the season of 1909 (with a fertilizer of dried blood,  $37\frac{3}{4}$  pounds per acre; acid phosphate, 75 pounds, and muriate of potash, 28 pounds,) was 3,961 pounds.

Para grass may be propagated from either roots or stem cuttings. The mature stems may be taken and cut into short pieces having two or three eyes in each piece. This may be planted by throwing up a small furrow with the plow, dropping the cuttings, and then throwing the furrow back. Planting should be done when there is sufficient moisture to keep the young plants growing well after starting. Perhaps the best time to plant is just about the beginning of the rainy season. If the planting is done early in the spring there is danger of dry weather injuring the stand more or less.

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Gainesville, Florida.

## Natal Grass

**T**HIS grass (*Tricholaena rosea*) is an annual grass from South Africa, which is now commonly grown in many tropical and semi-tropical countries. Sometimes it is called "Australian Redtop," or "Hawaiian Redtop," but it is not related to the true redtop. It was introduced into Florida some twenty years ago. It is now grown abundantly in Marion, Lake, Sumter, Seminole, Orange, and Polk counties, and to some extent in all parts of South Florida.

Natal grass makes its best growth on any good citrus land. It will grow on quite sandy soil, but will not produce as good yields as it will on the better soils.

The preparation of the seed-bed for Natal grass is similar to that for any other grass crop. It is not necessary to prepare a deep seed-bed, but it is essential to see that the surface is well pulverized. Plow the land "broadcast" to a depth of four to six inches. Then prepare the seed-bed by the use of the harrow. If the surface is rough, it may be necessary to harrow the field several times. The tooth harrow or the Acme harrow are two good implements that can be used to advantage for this work.

The seed may be sown broadcast, or in rows eight or ten inches apart. The seed is very light and fluffy and it is difficult to scatter it uniformly over the surface of the soil. This, however, can be overcome to a considerable extent if the seed is mixed with moist sand. If the sand is made too wet it will not be possible to get an even distribution. It will require ten to fourteen pounds of seed to plant an acre. It will always be found best to use a liberal quantity of seed, so as to get a good stand.

If the seed is covered too deeply a poor stand is likely to be the result. The seed is very small, and it is not possible for it to come up through a heavy covering of soil.

Natal grass seed is widely distributed by the wind, and it may come up from seed in cultivated fields or elsewhere like crab grass. It is more or less winter-killed in Central Florida, but farther south, or in warm winters it may live over from one season to the next. There should be no fear of it becoming a pest in cultivated fields, for it can be eradicated without difficulty. It ripens seed uniformly, so if it is made into hay just before it blooms, no seeds will be scattered, and next year there will be little or no Natal grass in that field.

If the seed is sown about May 1, the first crop of hay will be ready for harvesting about July 15. Natal grass requires about eighty to eighty-five days from seeding to maturity under favorable conditions. The yield of hay per acre varies greatly, depending upon the soil and climatic conditions. The heavier yields will, of course, be obtained from the better soils.

Natal grass was first planted by the Experiment Station in 1892, and on the Station farm at Gainesville in May, 1908, where it has been growing each year since.

The average yield of hay per acre during the past four years has been about one and a quarter tons. The heaviest yield of hay during one season was 2.6 tons per acre; this being the yield of two cuttings. The soil upon which it was grown is what is classed as high pine land, such as would produce 15 to 20 bushels of corn per acre.

The following figures give some idea of the feeding value of Natal grass hay when compared with timothy:

	Natal	Timothy
Moisture.....	9.75 per cent.....	13.2 per cent
Fiber.....	36.75 per cent.....	29.0 per cent
Ash.....	5.02 per cent.....	4.4 per cent
Protein.....	7.45 per cent.....	5.9 per cent
Starch, sugar, etc.....	39.23 per cent.....	45.0 per cent
Fats, etc.....	1.80 per cent.....	2.5 per cent

Large quantities of hay of various kinds are shipped into Florida each year. When hay was cheap, the buying of a few tons each winter did not require the expenditure of much cash. But now when we have to pay as much or more than \$1.00 or \$1.50 per hundred for hay, the expenditure for this feed alone soon amounts to a considerable sum. Thus a large sum of money is sent out of the state each year for a product that we can and should produce at home. Every ton of hay produced on the farm means that much extra profit for the season's work.

## Guinea Grass

**G**UINEA grass is better adapted to the southern peninsula of Florida than to the center or the north, as it is very subject to frost. Even at Gainesville it is injured more or less with the winter's cold. Where it is not entirely killed by the cold, the grass seems to be weakened to such an extent that it makes a slow and unsatisfactory growth for some time. However, in the southern part of Florida on the best land, Guinea grass makes a good growth, supplying a large amount of pasturage, and if not pastured will produce a satisfactory quantity of hay. The quality of the hay, however, is not first class unless it be cut early in the season before the stems become hard and woody.

Guinea grass may be propagated from roots or from seed. So far, its propagation from seed has not been satisfactory. Much better success has been secured by using the roots.

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## Oats, Barley and Rye

**O**ATS will also furnish good winter grazing. They may be sown in September or October. In from ten to twelve weeks after sowing they will begin to furnish good grazing. If not pastured too close they will continue to supply pasturage until late spring.

Barley is another crop that may be planted during the fall season and that will supply good grazing through the winter. Like oats, it will be ready to pasture in ten to twelve weeks after planting.

Rye will also be found a good winter crop for the grazing of cattle, hogs and sheep. It may be sown during September, and will then be ready to pasture during the latter part of December, continuing to furnish grazing until April.

The oats, barley and rye can be sown broadcast. Use from two and a half to three bushels of seed per acre of oats, and about one and a half bushels of barley or rye.

The oats, barley and rye may be sown separately, or they may be mixed and sown together. Some prefer oats alone for pasture; while others prefer a mixture of oats, barley and rye. A mixed pasture, as a rule, will give more satisfactory results. The seed may be mixed for sowing in about the following proportions: one bushel of oats, one bushel of barley, and one bushel of rye.

In selecting a variety of oats, the Virginia Turf oat will perhaps give better results than any other, as it usually stools out well.

## Fertilizing

The important point is to fertilize in such a way as to induce a good growth. For this purpose it will only be necessary to apply a fertilizer containing about 5 per cent ammonia and about 7 per cent phosphoric acid. Apply from 200 to 500 pounds per acre.

This should be applied broadcast about a week or ten days before planting the seed. As the growth is pastured down, it would be well to scatter a light application of nitrate of soda, about 75 to 100 pounds per acre.

## Preparation of the Seed-Bed

To get the best results from these winter forage crops it is very important to give them a good place to live. By this we mean to put the seed-bed in the best possible condition so as to induce the most rapid growth. The ground should be plowed "broadcast" to a depth of six to eight inches. Then harrow two or three times if necessary to smooth and level the surface. This will put the surface soil in good condition to receive the seed. It will also put the soil in condition to retain more moisture, which is very necessary to the growth of the plant. The fertilizer will become available more quickly when the soil has been put in good condition.

## Pasturing

Do not pasture any of these crops when the ground is wet. Cattle or horses tramping over wet ground will do much harm.

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## Importance of Legumes

WE might first consider why legumes are important. There are two main reasons that may be given for the importance of this crop. First as soil builders: It is a well known fact that legumes are the only plants that we grow that do not deplete the soil in which they grow. Of course, the crops take more from the soil than they return to it. All other crops, such as various grasses, corn, sorghum, sugar cane, etc., draw very heavily upon the fertility in the soil and return nothing to it except what may be left in the field when the crop is harvested and plowed under as vegetable matter. Our method of farming in Florida here at the present time does not leave much of these crops in the field to be plowed under, hence the crops deplete the soils upon which they grow. The same may be said of the cotton crop, but the legume crops, no matter which ones we may grow, have the ability of taking nitrogen from the air through the leaves and depositing it in the soil.

This nitrogen may be used by the crop itself so it is left in the soil for the succeeding crops to draw from. In addition to the nitrogen deposited in the soil by the roots, stems and leaves, in fact the entire plant contains a considerable amount of nitrogen, and if the entire plant is plowed under, or in other words, returned to the soil, a very large amount of ammonia is thereby put back into the soil; or we might say that the plant itself, while growing, manufactures a large amount of fertility for the farmer. Of course, all legume crops do not supply the same amount of fertility. This depends largely on the manner of growth of the crop as to its value as a soil improver and the amount of fertility it may add to the soil.

Experiments have been conducted that show that a crop of velvet beans, that is, where the entire crop is used as a soil improver—and by this we mean the entire crop plowed under—will add about 170 pounds of ammonia to each acre of land in which they are grown. Perhaps the bare statements of 170 pounds of ammonia may have little meaning to many of us, but we can soon realize how much this means when we compare it with some form of commercial fertilizer which we are in the habit of buying and adding to the soil each year. For instance, should we try to supply 170 pounds of ammonia from dried blood it would mean the purchase of about 1,100 pounds of dried blood, or should we purchase it in the form of cottonseed meal, it would mean about 2,200 pounds of bright cottonseed meal. We might make another comparison as to the value of the velvet bean, which is one of our most important legumes for Florida. When the velvet bean crop was followed with oats, as compared to oats following crabgrass and millet, the yield of oats per acre from the velvet bean plot was 33 bushels of seed, while the yield of oats from the crabgrass and millet plot was only 8 bushels. The yield of oat straw from the velvet bean plot was something like 1,600 or 1,700 pounds, while the yield of oat straw from the crabgrass and millet plot was less than 300 pounds per acre. These few illustrations show the value of legumes as soil builders and soil improvers, or in other words, as a source of plant food in the soil.

Another question might rise: How best to dispose of legume crops that are grown on the farm? We find this to be true that for every \$100 worth of beggarweed hay that we may sell from the farm there goes with it about \$92.50 worth of fertilizer. What is true of the beggarweed hay is just as true of cowpeas or velvet bean hay, if they are converted into hay, but if the beggarweed or cowpea hay are converted into meat products or dairy products, but a very small percentage of the fertilizer value is sent from the farm. For instance, when we sell \$100 worth of pork or beef from the farm less than \$10 worth of fertilizer is sold. When we sell \$100 worth of butter only 10 cents worth of fertilizer leaves the farm in the form of butter. This shows the importance of not only growing legumes but also at the same time feeding them to live stock on the farm.

We have conducted quite a number of experiments to determine the value of these various legumes for the production of meat and dairy products. Most of this work has been done with the velvet bean. In an experiment in feeding cattle for beef production we found that the velvet bean not only produced the best grain per head for the animals but at the same time the cost per pound of gain was cheapest. When corn, velvet beans, and cottonseed hulls were fed the average daily gain per thousand pounds live weight was 4.14 pounds, and the cost per pound of gain was 7½ cents. When cottonseed meal and cottonseed hulls were fed the average daily gain per thousand pounds live weight was 2.57 pounds and the cost was 12 cents per pound of gain. This shows a decided difference not only in the average daily gain per head but also in the cost per pound of gain per head in favor of the velvet beans. The same has been our experience in our experiments in milk production. In all experiments in which the velvet bean has been used milk was produced at less cost per gallon than any other feed used; in fact, in some of our experiments we found by using velvet beans in comparison with cottonseed meal that milk was produced at 22 per cent less per gallon when the velvet beans were fed than when the cottonseed meal was fed. Or in other words, this made a difference in the cost of production of practically three cents per gallon in favor of the velvet beans.

## Some Legumes That Can Be Grown

PERHAPS no one farmer will wish to grow all of the various kinds of legumes that may be possible to be grown in Florida, neither is it practical for the writer to suggest to any one man or any one farmer just which legumes he should grow on his farm. The choice of crops must be left entirely to the farmer himself, and his choice will be governed largely as to what his plans for his farm may be; in other words, in how he disposes of his farm products. However, I will mention some of the legumes that are of more or less importance in Florida and that should receive due consideration from all Florida farmers, and from this list each farmer should select those crops that he feels will best fit into his farm operations, and to which his soil is best adapted. Among the list of legumes we can give probably there is no other legume that will adapt itself so well to Florida conditions as will the velvet bean. Along with this we might include all the members of the velvet bean family, such as the hybrid beans now being produced, the Chinese velvet bean, the Lyon bean, and the Yokohama bean.

Another important legume is the peanut. This is of importance not only as a hay crop but also as a grain crop for the fattening of hogs. As a hay crop the cowpea and beggarweed are two more legumes well worth growing, and if they are grown for no other

purpose than as a soil improver they will more than pay for the cost of their production. There are some other legumes not so well known in Florida, some of which may be found quite valuable on certain soils, and some of which may be entire failures in other sections of the state. Among these are soy beans, Kudzu vine, vetch, bur clover, and Japan clover. These are worthy of trial, but should be tried, however, on a small scale until it is found whether or not soil conditions are suitable for the growing of these crops. I might say, however, to those who wish to try soy beans that it will be found advisable to give the soil a light application of barn-yard manure before planting the crop, otherwise results may be unsatisfactory.

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## Velvet Beans

**T**HE velvet bean is the most rank-growing annual legume cultivated for forage and is one of the best plants for the production of feed and as a fertilizer crop in the rotation. It is not as good as the cowpea for making hay, as its growth is so strong and the vines are so long and tangled that it is difficult to cut and cure, though when cut early and well cured the hay is of excellent quality. It makes an immense amount of fall and winter grazing, produces seed abundantly, and leaves the soil in a fine condition for any following crop. It is one of the best plants for growing on newly cleared lands, as its growth is so dense that it smothers all grasses, sprouts, and weeds, and "civilizes" new soil better than any other crop.

To secure the best results, the vines must be given some support to keep them up from the ground, or they will not fruit well or make so vigorous a growth. Poles are sometimes used for the purpose, but they are troublesome and expensive, while growing cornstalks serve the purpose fairly well and are much cheaper. Pearl millet is also used for the same purpose and gives a better support than corn, but is less valuable for grain. Some planters top the corn as soon as the ears are fairly mature, asserting that the part of the stalk which is left is not pulled over by the vines as easily as is the taller whole stalk. Others plant three rows of corn and one of beans, maintaining that by that method they get a good crop of both corn and beans. Still others plant the corn in 6-foot rows and when it is about a foot high plant beans in the middles. Planted in this way, the corn makes a fair crop, and the vines have abundant support, though the late planting makes only a light yield of seed. The heaviest yield of both vines and seeds is undoubtedly secured when the beans are planted in the row at the same time as the corn, but with such treatment the yield of corn is usually small and difficult to gather.

When grown alone velvet beans should be planted at about the same time and in the same manner as corn, using 8 to 12 quarts of seed per acre. With a good support for the vines the yield of seed is very heavy, from 30 to 50 and sometimes as much as 75 bushels per acre. The seed is gathered by hand. When a crop of seed has been gathered the vines and immature seed left make rich grazing, and the fertilizing value of the crop is little reduced.

Grazing usually begins at about the time of the first frost and may be continued through the winter, as both vines and beans remain in an eatable condition. The beans are quite hard when mature and dry, but are eaten readily in the fall and again when they become slightly softened in late winter, so that all are consumed before the ground is plowed in the spring. Dairymen find that it gives the greatest stimulus to milk production when grazed in the fall, while beef growers value it more highly for winter grazing. Hogs usually find plenty of good feed left by the cattle. While it is undoubtedly the most productive annual legume, it has decided limitations owing to the long season required for its growth—about eight months.—*Extract from Bulletin No. 509, U. S. Department of Agriculture.*

## Cowpeas

COWPEAS are one of the best legumes we have in Florida and should have a place on every farm. They vary greatly in habit and time of growth. Some varieties produce long trailing vines, while others are usually erect and bushy in growth; some will ripen in two months from planting while others require four or five months; even the same variety varies greatly when planted on different soils or at different seasons. Cowpeas are inexpensive to grow and make a good growth on all soils except those which are very wet. They are excellent for hay or grazing and are the best summer catch crop for green-manuring and improving soils. Though this crop will make a fair growth on very poor soil it responds quickly to an application of fertilizer, and as a heavy growth of cowpeas is the best possible insurance for a heavy following crop, it pays well to use any fertilizer which will produce a more thrifty growth of vines.

Cowpeas may be sown broadcast or in drills 3 to 4 feet apart, the first method requiring more seed and less labor, while the drills permit of one or two cultivations, require less seed, are more easily mowed for hay, and usually give a heavier yield. From 4 to 6 pecks per acre are used in broadcasting and from 2 to 3 pecks for seeding in drills, though even 2 quarts of some varieties are sufficient when carefully dropped by hand. A common and excellent practice is to sow them between the rows of corn just before the last cultivation.

When cowpeas are sown broadcast with a small-growing variety of sorghum, like the Amber, using a bushel of the peas and half a

bushel of the sorghum seed per acre, the mixture makes fine hay, and when sown in drills with a coarser sorghum, like Orange, makes excellent silage.

Saving the hay in good condition is usually a difficult matter in unfavorable weather, and for that reason the planting should be done at such a time that the crop will mature during the dry weather which usually prevails during September and October. For making the best hay the vines should be cut as soon as the earliest pods become yellow, though the work may be delayed a few days if rain should threaten. When cut at that stage the vines cure much more easily and rapidly than when cut earlier, the total yield is heaviest, and though the hay may be not quite so tender it will be eaten readily and will have a higher nutritive value.

A common practice in saving the hay is to start the mower as soon as the dew is off in the morning and run it until noon. As soon as the upper surface of the cut vines is well wilted a tedder is run over the field to turn the vines over and expose them more thoroughly to the sun and air. If the crop is very heavy, this may need to be done twice. When a tedder is not available the work can be done with a pitchfork, but this is slower and more expensive. Vines which have been cut in the morning and turned in the afternoon will usually be dry enough to put into small cocks the following afternoon, and if the weather promises to be favorable they should be left in these cocks two or three days before they are hauled to the barn. If it should rain before the vines are put in cocks, they should not be touched until the surface is well dried and then turned as though freshly cut. If the hay is handled promptly and properly, a light rain does very little harm, even after curing has begun, and a heavy rain may fall on freshly cut vines and do little or no damage.

The vines should be handled as little as possible or many of the leaves will drop and be lost. When the weather is fair and settled the freshly cut vines are sometimes rolled into bundles as large as can be handled easily with a pitchfork and allowed to lie in the field until thoroughly dry. This method saves labor and prevents any loss of leaves, but the tangled bundles are hard to dry if they should be wet with rain. When peas are grown with corn and are wanted for hay it is best to cut the vines and stalks together and make into windrows the same day. The cornstalks prevent the vines from packing closely, so that they dry more quickly. Such hay can often be put in the barn safely two days after it is cut.

Cowpea hay is often cured by stacking the wilted vines around poles 4 to 6 feet high with two or three crosspieces nailed on each. A still better device consists of four poles 6 feet long joined at the top and held 4 feet apart at the bottom by means of crosspieces on which the vines are piled so as to cover the pyramid. The object of both devices is to permit the air to circulate more freely among the vines and so dry them with very little handling and loss of leaves.

When fed on well-cured cowpea hay containing a fair amount of matured pods, beef cattle, yearlings, horses and mules will keep in good condition through the winter with no grain feed.

The selection of the variety for planting should be determined by the use to be made of the crop. If a heavy yield of hay is the principal object, a vigorous upright variety, like the Whippoorwill, is best.

If the crop is to be pastured or left to decay on the ground through the winter, any of the trailing sorts like the Black, Red Ripper, and Unknown are good. The Blacks are especially esteemed for this purpose, as the seeds do not decay easily. Where land is infested with wilt or with root knot, only varieties resistant to these diseases, like the Iron and the Brabham, should be used.—*Extract from Bulletin No. 509, U. S. Department of Agriculture.*

## Peanuts

PEANUTS are often profitable both for hay and for grazing, the Spanish variety being best suited to these purposes. The crop does best on light sandy soil, which must contain a good supply of lime or many of the pods will fail to fill. Any sandy soil may be made to produce good yields by the application of 50 bushels of ground limestone per acre, broadcast, just before the ground is plowed. The planting requires about 2 bushels of seed per acre, and in the northern part of the cotton region these should be carefully shelled before planting, though that is not necessary in the southern section. The crop requires no special cultivation except to keep it free from weeds and to keep the surface so mellow that the shoots can bury themselves easily. If the crop is to be used for hay, it should be gathered just before the first frost. When vines of the Spanish variety are pulled nearly all of the nuts will adhere to the stems and after drying will make a hay even richer in protein than that from cowpeas or soy beans. Hogs eat both the vines and the nuts, and the crop should not be grazed before the nuts begin to mature. Hogs pastured on peanuts are fattened very cheaply, but the pork is more oily than that from corn-fed animals. In the Atlantic coast region peanuts are often planted with corn, after the manner of planting cowpeas and soy beans.—*Extract from Bulletin No. 509, U. S. Department of Agriculture.*

## Miscellaneous Forage and Hay Crops

THE lack of sufficient dry roughage can be supplemented to a large extent by the growing of some green winter forage crop. There are a number of good winter forage crops that can be planted during the fall that will supply an abundance of good winter pasture.

## Dwarf Essex Rape

**D**WARF Essex rape is one of the best winter pasture crops. It is easily grown. It will stand several degrees of frost, supplies an abundance of good nutritious pasturing, and continues to grow until late spring. With proper care, difficulties in feeding can be avoided. The cost of the seed to plant an acre of ground is only a trifle compared with the amount of feed that can be obtained from it.

### How to Plant

Prepare a good seed-bed by plowing the ground thoroughly to a depth of six to eight inches. Give a liberal application of a good vegetable fertilizer. Plant in rows 24 to 30 inches apart, using from three to five pounds of seed per acre. Eight or ten weeks after planting, it may be pastured, or cut and fed to cattle, hogs, or sheep. As soon as pastured or harvested, give an application of nitrate of soda at the rate of 75 to 100 pounds per acre, and give good cultivation. In six or eight weeks it will again be ready to pasture. It should then be given another application of nitrate of soda and cultivated. If there is sufficient moisture in the soil at that time, it will soon make a good growth.

## Japanese Cane

**F**ORAGE crops are of considerable importance here in Florida. Nearly every season there is some portion of the year, usually during the winter, when it is necessary to supply our live stock with feed other than what they can obtain from the open range.

The following forage crops will be found suitable for Florida conditions, and they will supply an abundance of good forage:

Japanese cane is perhaps the best forage crop that we have in Florida. It was first introduced into Florida from the Louisiana Experiment Station some eighteen years ago. It was grown at the Louisiana Station for a number of years in comparison with other varieties of sugar cane as a source of sugar and syrup. When first introduced, Japanese cane was grown for the production of syrup. It makes a good quality of syrup and a good quantity, but the cost of grinding and stripping is more expensive than for the regular sugar cane, and for that reason is not of as much value as the regular sugar cane for this purpose. It is well adapted to almost all sections of Florida and almost all kinds of soil. Like all of our other crops, however, to make its best growth, it must be planted on the best soil. Japanese cane will furnish good pasturage from the middle of November until March. When pastured, however, there is more or less waste, and perhaps the most economical way to handle it is to cut it and cure

it as dry forage, or put it in the silo. It makes a good silage and is perhaps one of our best crops for this purpose, because it gives a larger yield per acre of green forage than any crop we now grow. It is also a valuable crop to use as a dry winter forage. It is an easy crop to cure, and the loss in storage is small. If it is stored in a barn or shed, there will be hardly any loss. At the Experiment Station we have stored it in the barn in November and December and kept it until the following June and July. Six months after harvesting, there was practically no loss; and when run through a feed cutter, it was relished by cattle, horses and mules. It is not necessary, however, to store it in a barn, but any temporary roof can be put up so as to protect it from the weather. One advantage of the Japanese cane is that when properly handled, one planting will last a long time.

### Canes for Planting

The number of canes required to plant an acre will depend upon the distance between the rows, the distance at which the canes are dropped in the row, and the length to which the canes are cut. Our experience has shown that for rows six feet apart, three thousand whole canes are sufficient to plant an acre, and if good seed is used, are enough to give an excellent stand. Select only healthy canes, and reject all that are green and unripe.

It is important that a good stand of cane be obtained at the first planting. If only a half or two-thirds of a stand be secured, it will mean that a much smaller yield per acre will be obtained although the cost of cultivation will be the same as for a heavy crop. For this reason it is advisable to use a sufficient amount of seed cane to secure a perfect stand.

### Fertilizing

The best formula for Japanese cane is yet an unsettled question. We know, however, that Japanese cane has a large root system and is a gross feeder and so we may use quite a liberal amount of fertilizer. Any crop that produces such a tonnage of forage must necessarily draw heavily upon the fertility in the soil. The following formula has given good results in the Experiment Station farm, and perhaps may be taken as a guide until we get better information:

Ammonia.....	3 per cent
Phosphoric acid.....	.6 per cent
Potash.....	.7 per cent

Apply at the rate of from four to six hundred pounds per acre. If the soil is at all acid, it will be found profitable to give an application of from one to two tons of ground limestone per acre. Our experience has been that an application of ground limestone has increased the yield about fifty per cent for one year.

## Planting

The planting of Japanese cane may be done at almost any time from November to March. For central and south Florida, November will be found a good month in which to plant. For the northern and western part of the state, perhaps the spring planting in March will be preferable.

## Cultivation

The cultivation of Japanese cane should be the same as for corn or cotton. The important point to remember is the thorough preparation of the seed-bed before planting the canes. The cultivation during the growth of the crop should be frequent and shallow. Deep cultivation tends to prune out too many of the feeding roots near the surface. Shallow cultivation is preferable for a crop of this kind. However, the first cultivation may be from four to six inches deep while the remaining cultivations as the crop increases in height should be shallower, and perhaps should not be more than one or two inches.

## The Yield

The yield per acre is from ten to thirty tons of green fodder—sometimes as high as forty to fifty tons on rich land.

## Sorghum

**T**HERE are a large number of varieties of sorghums that are well adapted to Florida, and which should be grown more generally than at the present time. Among our best varieties are the Sumac, Gooseneck, Orange, and Early Amber. The only advantage of the Early Amber being that it matures earlier than any of the other varieties mentioned, but it does not produce as heavy a yield.

Sorghum grows well on almost any good land. Ground that is well suited for growing corn, cotton, or vegetables, will give good yields of sorghum either as dry forage or as green feed. Neither the heavy clays or very light sandy soils are well suited for this crop. Sorghum differs from Japanese cane in that it is an annual, and must be planted each year. However, in the southern part of the state, it may live from year to year if not pastured too close, or if there is not sufficient frost to kill it.

The preparation of the seed-bed, cultivation, and fertilizing will be practically the same as for Japanese cane. Sorghum may be used as a pasture crop, as silage, as a soiling crop, or may be cut and cured for hay.

## Planting

Sorghum seed may be sown any time from early in March until latter part of July or the first of August. When possible it is advisable to sow early, as then the first cutting can be harvested in July, and with favorable conditions another crop may be harvested in October; or if it is used for pasture, we can begin pasturing in June, and with favorable conditions the field should supply good pasturage until frost in the fall. When once pastured down, the stock should be removed, and the sorghum given an application of fertilizer and cultivation, and in a short time the field will be ready to pasture again. The quality of seed required to plant an acre will depend upon the method of sowing, whether in drills or broadcast. If sown in drills, from 12 to 20 pounds of seed will be required per acre. If sown broadcast, more seed will be needed, varying from one to two bushels. It is likely that if sown in rows, a distance of three or three and a half feet between the rows and from two to three inches between the plants in the drill, will be found satisfactory. This distance will permit of cultivation being carried on, which will ensure large yields.

## Fertilizing

Perhaps a fertilizer formula containing about 4 per cent ammonia, 6 per cent phosphoric acid, and 6 per cent potash, applied at the rate of 400 to 800 pounds per acre, will give best results.

## Cultivation

Too much attention cannot be given to the preparation of the seed-bed and the cultivation of the growing crop. A two-horse cultivator can be used to good advantage in cultivating this crop. With a two-horse cultivator the cost of cultivation will be reduced to a minimum, and the work accomplished will be better than that done with a one-horse plow. With the two-horse cultivator, one man or a boy and two mules will cultivate more than twice the area that can be done with a one-horse implement. This means that the labor of cultivation will be reduced one-half. The number of cultivations that this crop should receive will depend on local conditions. However, it should receive its first cultivation very soon after the crop appears above ground, and it should be cultivated as frequently as every ten days or two weeks, until it is ready to pasture for forage. Sorghum makes a good pasture for all classes of live stock. Pasturing may begin when the plants are only a few inches high; but for the best results, the crop should not be pastured until the sorghum is about one and a half or two feet in height. Still better results will be obtained if it is not pastured until it begins to head up, and the seed reaches the hard-dough stage.

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## Cassava

**T**HE best soil for growing cassava is a light, rich, sandy loam, and many growers prefer that such a soil could be underlaid by a hardpan, which will prevent the roots from going too deep into the ground. The soil should be dry rather than wet, and fair yields can be secured from soil too dry for corn and most other crops. It is emphatically a drought-resistant plant, a characteristic which makes it specially valuable for sandy soils, which become very dry even when drought is of only a few weeks' duration. While abundant moisture is needed to induce the seed canes to sprout, after the young plants become well established they will bear long continued and extreme drouth with little injury, and the crop never proves a total failure for want of rain.

While the soil should be light and dry, it should be as rich as for any other crop. As the roots are long and spreading, it saves considerable labor in digging if they can be kept near the surface of the ground, so an underlying hardpan is not as objectionable as when taprooted plants, or plants which must draw an abundant supply of moisture from the subsoil, are to be grown. In lifting the roots out of the ground in digging it makes a great difference whether they are covered with 6 or 16 inches of soil.

A swampy, seepy, or wet soil should be avoided, as such soils will produce only a sickly growth of plants, and the yield of roots will be less than on a drier soil. Heavy, black soils are also objectionable, as they produce only a small yield, and the compactness of the soil makes the roots hard to dig. Soils which are excessively rich in humus should also be avoided, as they produce an excessive growth of tops with small and watery roots. Heavy, barren clay soils are equally unfitted to the crop, as they produce small yields, which are difficult to handle.

## Crop Rotation

In the region where cassava can be grown the velvet bean will make a rank growth and mature its seed, and so is generally preferred to the cowpea, though the latter has the advantage of making its growth in a shorter time and so is commonly used where the land has been occupied with oats or some other crop during the spring and early summer. As these legumes are very rich in protein, they make the very best of material for forming a balanced ration when fed in connection with the cassava, which is distinctively a carbonaceous feed.

## Plowing, Marking, Application of Fertilizer

The ground is prepared for planting by plowing it broadcast as for any ordinary crop, the plowing being done only a short time before planting and followed by a harrowing to smooth off rough places.

The marking in one direction may be done with an ordinary corn marker marking three or four rows at once, or by using a small plow. The cross marking, however, should always be done with a plow and the rows opened so deep that the seed canes can be easily covered. If fertilizer is to be used it should be applied at this time, and the work may be done by running an ordinary fertilizer distributor along the rows or by scattering it in the furrows by hand and then following with a bull-tongue plow to mix it with the soil. When well-rotted stable manure or cottonseed meal is used, it may be dropped at the intersections of the rows where the planting is to be done, but when strong commercial fertilizers like muriate of potash and acid phosphate are used, they must be well mixed with the soil, as they are almost sure to burn and injure the seed canes with which they may come in contact.

## Time of Planting

Planting is done as early in the spring as is safe, not later than February in middle and southern Florida, and not later than the first of April in any part of the cassava-growing region. Some growers prefer planting in December or January, and that practice is often very successful, but should never be followed where the soil is liable to remain water soaked for any great length of time during the winter. On well-drained, light, sandy soils this very early planting is often the better method, as it enables the seed canes to take advantage of every warm day to form roots and so be ready for active growth a little earlier in the spring, but it is not a safe method on any but the driest of soils.

The crop is not grown from seeds but from the canes or stalks grown the previous season and kept through the winter much as sugar cane is preserved for planting. When the field is ready for planting the seed canes are cut in pieces from 4 to 6 inches in length. Some planters insist on having each piece not less than 6 inches long and prefer 7 or 8 inches, claiming that such large joints produce a quicker growth and more vigorous plants than can be secured from smaller pieces, and also claiming that there is less danger of their drying out if a severe drought occurs immediately after planting. The majority, however, use pieces from three to four inches in length and claim that such a size is ample, and that a better stand can be secured by planting two 3-inch pieces than one 6-inch piece in a hill.

## Dropping and Covering the Canes

The pieces of seed cane are dropped, one at each cross row, and covered with a plow or hoe as Irish potatoes are covered, the covering being from 2 to 4 inches in depth, the deeper covering being given on the lighter soil.

## Cultivation

Cassava requires no special cultivation beyond that needed to keep the ground free from weeds and the surface loose and friable. The first cultivation is often given with a smoothing harrow before the young sprouts reach the surface of the ground. Some growers give this cultivation by plowing deeply between the rows and cleaning the remainder of the surface with a hoe, while others prefer a five-toothed cultivator for the work. All the later cultivations must be as shallow as possible, for the cassava roots lie very near the surface of the ground. Some growers use a single section of a smoothing harrow for all the later cultivations, and find it very satisfactory when used with sufficient frequency to prevent any grass or weeds from becoming firmly rooted. Others prefer a 24-inch sweep run very shallow, while still others prefer a five-toothed cultivator.

Whatever implement may be preferred should be used so frequently that the surface of the ground will at all times be covered with a dust mulch to prevent the sandy soil from becoming too dry, and the cultivation should be continued until the plants become of sufficient size to shade the ground. Two cultivations are often sufficient on land which is fairly free from weeds, as the cassava plants soon form a dense shade.

## Harvesting the Crop—Dangers To Be Avoided

One of the most difficult things in growing cassava is saving the seed canes for planting. They are killed by a frost which is severe enough to kill tomato vines. If stored when too fresh, or kept too dry, they are liable to suffer from dry rot; and if covered too closely, or allowed to become thoroughly wet, they are almost sure to decay. Still there are many growers who are successful in saving the canes year after year, and a little experience shows what is really necessary as well as what must be avoided.

## Harvesting the Crop—Time of Cutting

Only well-matured canes can be kept through the winter, and these should be cut as late in the season as is possible, since the roots are then making their best growth and cease to grow as soon as the canes are cut. Still, the cutting must not be delayed too long, as a moderate frost will kill them. When there is a fair stand of plants the canes from 1 acre will be sufficient to plant from 4 to 6 acres the following season; so when it is not desired to increase the acreage rapidly, the safer plan is to store one lot before there is any danger from frost, and another lot later in the season when the roots are gathered provided the second lot is then in better condition than the first.

## Harvesting the Crop—Portion of Stem To Be Saved

The plants usually grow with a single stem from 1 to 2 feet in height, and then divide into three branches. These branches make a growth about equaling that of the main stem and then divide into three, and in time these divisions may be again divided and subdivided into threes. The main stem and the three branches below the second forking will mature sufficiently to be saved, but the upper branches should usually be discarded. When the canes are cut, which should be done about 6 inches above the surface of the ground, the immature ends and leaves are cut off and left to decay in the field, as they would be liable to heat and cause decay. Two of the three branches on the part to be saved are cut from the main stem so that they can be stored in less space.

## Harvesting the Crop—Methods of Storing

A common method in central Florida is to dig a ditch about 18 inches in depth, from 3 to 4 feet wide, and as long as may be needed. The canes are set on end in this ditch, packed as closely as possible, and then covered with straw or litter, which is held in place with a little earth. The top covering is left rather thin until cold weather, when more earth is added.

Another method is to build a permanent house, similar to a potato house, with sides about 3 feet in height. The canes are stood on end to fill the house, their tops being well covered with straw and the sides of the house well banked with earth.

## Digging the Roots

Digging usually begins about the 1st of November and may continue through the entire year where used for feeding stock, though usually the roots are not used between May and October. If the entire crop is not wanted for use during the winter following its growth, a part of it may be left in the ground for another season, as the roots will continue to grow several years if not disturbed. Roots which have grown two or more seasons often reach an enormous size, sometimes as much as 8 feet in length and forming clusters weighing more than 100 pounds; but they become more hard and woody than at the end of the first season, and so are not as good for the manufacture of starch or for feeding as those which have grown only one season.

When it is known beforehand that a part of the crop is to be kept until the second season, it is better to dig alternate rows, so that the plants remaining will be less crowded.

## Storing the Roots

In order to preserve them for any length of time after they are removed from the ground the roots must be kept warm and dry. Usually they begin to blacken and decay within three or four days after they are dug, so the common practice is to dig from day to day as they are needed, or at most for not more than a week in advance. Roots may often be kept for weeks, or even two or three months, in a warm room, but when exposed to air of the ordinary winter temperature and dampness they soon show black streaks, quickly followed by souring and a soft decay which renders them wholly unfit for any use. Roots which have become soured make a very unwholesome food and should never be given to any kind of stock.

## Cassava as a Stock Feed

Fully 95 per cent of the cassava now grown in this country is fed to live stock, the amount used by the starch factories being an insignificant part of the crop. It is fed to horses, mules, milch cows, fattening cattle, hogs, and poultry. All kinds of stock eat it with relish and thrive upon it much better than when confined to any dry feed. Being so highly carbonaceous in its composition, it is commonly fed in combination with bran, shorts, cottonseed meal, or other nitrogenous grain feed and, when judiciously used, it is one of the most inexpensive feeds which can be grown. It is less watery than either sweet or Irish potatoes or turnips, while its yield is fully twice as great. As the roots are always fed in a fresh condition, they furnish an excellent substitute for winter pasture, and so do much to keep animals in good condition through the season of dry feed. Where the crop can be grown successfully, it can be made to take the place of a silo, as the feed is much more nutritious than silage, and can be used economically when one has too few animals to make a silo profitable.

The roots are so smooth that if they are dug when the soil is dry they need no washing or cleaning before being fed, and no special preparation beyond cutting them into small pieces before feeding them to cattle.

## Feeding Value

The proportion of water in the fresh roots is somewhat larger early in the season than in winter, but averages about 66 per cent. With that amount of water the analysis of fresh roots, based on the analysis of dry roots, would be approximately as follows:

Moisture.....	66.00
Ash.....	.71
Protein.....	1.07
Crude fiber.....	1.83
Nitrogen—free extract.....	30.24
Ether extract.....	.15

This makes a feed in which the carbohydrates are largely in excess and which has a nutritive ratio of 1:28.5 instead of 1:7, which is about the proportion preferred by the most successful feeders. Fortunately, however, velvet beans or cowpeas are the cheapest hay feeds which can be grown in the cassava-growing regions, and cottonseed meal is the cheapest grain feed which can be purchased, and all these feeds are unusually rich in protein and deficient in carbohydrates; so that a combination of cassava with either of these makes a perfectly balanced ration which is easily varied to meet the needs of growing animals, of milch cows, or of stock which is being fattened.

## Feeding the Cattle—Effect on Milk

Cassava is fed to cattle more than to any other kind of live stock, and is valued especially for milch cows and for fattening beef cattle. It is fully equal to silage in stimulating a flow of milk, to which it gives a rich color but no distinct flavor such as comes from giving silage, turnips, and some other feeds when used too freely.

## Feeding the Cattle—Methods of Feeding

Cassava can be fed very liberally without endangering the health of an animal, some feeders using as much as a 10-quart bucketful twice daily. In feeding to cows and to beef animals the roots should be cut or broken into small pieces to prevent any danger from choking, though this is not necessary when feeding to horses and hogs. Some crush the roots by laying them on a block and pounding them with a mallet, and as the fresh roots are very brittle the work can be done very quickly. Others put the roots in a box and chop them with a spade, while a root cutter, such as is used in slicing turnips and sugar beets, is still better.

## Feeding the Cattle—Value in Fattening Cattle

The very large proportion of starch which it contains makes cassava specially valuable in fattening cattle, as it not only furnishes the elements necessary for the production of fat, but it also furnishes the fresh and succulent feed needed to keep the animals in their best and most thrifty condition. When velvet bean or peavine hay can be used for roughage no grain need be used, but with other hays and when the animals depend on grazing for roughage, it is better to add a small amount of cottonseed meal to the cassava to provide the required amount of protein.

## Feeding to Hogs

Nearly everyone who grows cassava uses it to a greater or less extent for feeding hogs. In some cases the hogs are turned into the field and allowed to gather the whole crop for themselves, and, while this method is very satisfactory so far as the fattening of the hogs is

concerned, it is not the most economical of feed, as many roots are pulled out of the ground and left, where they soon decay. In every field where cassava has been grown there are always many broken roots left in the ground after the crop has been gathered, and these will soon be found by hogs when they are turned into the field; but, excepting in such cases, it is seldom a good practice to allow the hogs to do the harvesting.

Cassava is too carbonaceous to be the best feed for growing pigs, and when fed to such animals should always be mixed with shorts, bran, peas, or some other nitrogenous food which will furnish material for bone and muscle. When fed on an exclusive diet of cassava, hogs fatten very rapidly and soon become too fat for making the very best quality of pork, while their growth is very slow and unsatisfactory. When the hogs have the run of a field of cowpeas, velvet beans, or peanuts, they will secure so much nitrogenous food that they may safely be given all the cassava they will eat. Hogs eat it greedily, and prefer it to corn when both are placed before them.

Many feeders use cassava exclusively during the fattening period, after the animals have reached sufficient size, and find it very satisfactory. The pork is very white in color, of fine flavor, and, though perhaps not quite so firm as that from corn-fed hogs, is much more firm and shrinks less in cooking than that from animals fattened on cowpeas or peanuts. When kept for a considerable time on cassava feed alone, it is better to make half the feed of corn or rice bran during the last two or three weeks before butchering, though this is hardly necessary when they have the run of a good pasture.

## Feeding to Poultry

In localities where it is grown, cassava is used more commonly than corn in the feeding of poultry. It needs no preparation before feeding, as the roots are so tender that they can be eaten readily, and poultry eat them as greedily as do other kinds of stock. When fed alone cassava makes hens so fat that they do not lay well, as is the case when they are given an exclusive corn diet, so it is better to mix it with wheat, oats, or some similar nitrogenous feed. It is unsurpassed when fowls are to be fattened for market, as it makes a rapid increase in weight with very small expense.

## Millets

**A**MONG the millets which are most valuable to Florida are the common, German, pearl and Hungarian. Of these different varieties the German millet seems to be the most popular. According to the Department of Agriculture, German millet makes a much heavier yield than any of the others when grown on a moist, rich

soil, but is not as well adapted to dry uplands. The hay is coarser than that of the others and should never be allowed to become overripe. All of these millets make their best growth during warm weather, and so are used largely as catch crops, to be sown in May or June, on land from which oats or some other early crop has been gathered, or on land which is wanted for planting in September or October.

They are shallow-rooting plants, and therefore the upper 2 or 3 inches of soil should be made as fine and mellow as possible before seeding. When a previous crop has just been removed a thorough disking is usually all that is needed, after which the ground should be harrowed smooth and the seed sown at the rate of 2 to 3 pecks per acre and covered by rolling or by light harrowing. Rich heavy soils require less seed than those which are thin and light. It is important that all of the varieties be cut early, as when overripe the hay is very harsh and woody, is not easily digested, and often has a decidedly laxative effect when fed to horses or mules. A common practice is to cut as soon as the grass is well headed, which will be in 40 to 50 days from sowing for the Hungarian, 50 to 60 days for the common, and 60 to 70 days for the German. If the weather or other conditions are such that it can not be cut until the seed is well developed, it will usually be better to let it stand a week or 10 days longer and then save it for seed, which as a rule brings a good price.

A seed crop should be cut, bound, and threshed like wheat, the threshing leaving the straw so broken and splintered that it is in fair condition for feeding. Many feeders object to using millet hay exclusively as feed for horses on account of its effects on the kidneys, but one daily feed of millet and one of some other kind of hay make an excellent combination.

## Chufas

CHUFAS are a profitable crop on sandy soils where winter grazing is wanted for hogs and poultry. They grow best on soils which are very light and sandy and yield well with a moderate amount of cultivation. They involve no expense for gathering and storing, except for the small amount of seed tubers which may be wanted for the following season. Chufas should be planted in early spring about a foot apart in rows 3 feet apart, or as close as they can be cultivated conveniently, using about half a bushel of seed per acre. No special care is required, except to keep the ground free from weeds. They can be used from September to January.—*Extract from Bulletin No. 509, U. S. Department of Agriculture.*

## Spineless Cactus

CACTUS is a crop suited to semi-arid regions, and we have no evidence that it will be profitable for Florida. We suggest that farmers who plant cactus should do so on a small scale at first.

### Yield Per Acre

There are few or no data to be had here in Florida as to the probable yield that we may expect from this crop. In California, with the best care and cultivation, yields are reported of from 20 to 25 tons per acre. These yields were obtained from a field where all missing plants were replaced from time to time during the year, so that these ought to be maximum returns.

### Feeding Value

The following table gives the average composition of cactus and a few other crops grown in Florida. This shows clearly that the cactus contains a higher percentage of water and a lower percentage of protein, nitrogen-free extract, and fat, than the forage crops usually grown:

#### Average Composition

	Water	Ash	Crude Protein	Crude Fat	Nitrogen-Free Extract	Crude Fibre
Cactus.....	92.25	1.75	.63	.16	4.08	1.19
Bermuda grass.....	71.70	2.10	2.20	.90	17.2	5.90
Sorghum silage.....	76.10	1.10	.80	.30	15.3	6.40
Sweet potatoes.....	68.30	1.10	1.90	.70	26.8	1.10
Natal grass (hay).....	9.75	5.02	7.45	1.80	39.23	36.75

### Planting

Cactus is usually grown from cuttings. Whole slabs may be used, or the larger slabs may be cut into smaller pieces. The slabs or pieces should then be set in the ground with about one-half of their length under ground. Plant in rows 4 to 6 feet apart, and 3 to 4 feet apart in the row.

### Conditions for Growth

Ideal conditions for the growing of spineless cactus are about as follows: A warm, loamy, well-drained soil. The temperature should never fall below 21 degrees, F. There should be little or no rainfall during the winter, so that plants may have a dormant rest period.

### Harvesting

Cactus may be harvested and fed at almost any period of growth, but stock appear to relish them most when the slabs have matured. Best results will be secured with this crop if it is fed during the drier portion of the year when other green or succulent feed is scarce. No success will be had in storing this crop.

## Where Slabs May Be Purchased

At one time the following parties had slabs for sale at reasonable prices: Higo Thum, Lakeside, Cal.; A. A. Anderson, El Centro, Cal., and Geo. E. Craig, Merced, Cal. The above parties were at one time selling slabs at 5 and 10 cents a cutting. Griffing Bros. Co., Little River, Fla.; Mohr & Son, Little River, Fla.; C. C. Redgrave, Lakeland, Fla., and the American Spineless Cactus, Inc., Jacksonville, Fla., have been selling slabs at somewhat higher prices. More information can be obtained free by sending for a copy of Farmers' Bulletin No. 483, to the U. S. Department of Agriculture, Washington, D. C.

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Gainesville, Florida.

## The Kudzu Vine

THE Kudzu vine (*Pueraria thumbergiana*) is a leguminous plant of which but little is known. It is a native of Japan and China, and is a perennial with large fleshy roots. In the north the vine is killed to the ground by frost; but in the absence of frost the stems mature. Kudzu vine has been largely used as an ornamental covering for arbors and verandas. The vines often grow forty to sixty feet long. The growth resembles the velvet bean. When allowed to grow on the ground the vine takes root at the joints which may be used to transplant in the field. True seed may be obtained from several northern seed houses and sown in rows four feet apart, and in two years' time plants from the rooted joints may be transplanted to the field.

### Planting

Rooted joints may be planted any time from January to April 1st, preferably February and March. Make the rows four to eight feet apart and set the plants from two to four feet apart in the rows. Plants are offered for sale by C. E. Pleas, Chipley; E. P. Eppes, Tallahassee; B. M. Thompson, Pensacola; Joe Berry, Alachua, and S. G. Hull, Apopka, Fla.

### The Hay

The hay obtained is of first quality. It compares favorably with that of cowpeas, beggarweed, and alfalfa in feeding value. The yield obtained per acre on the Experiment Station farm has been somewhat disappointing. There appears to be no exact or extended data as to its value as a pasture crop.

Those who contemplate planting Kudzu should do so on a small scale until they see that their land and locality is well adapted to this crop.

## Silage for Beef Cattle

**T**HERE is no roughage which is of more importance to the producer of beef cattle than silage. The value of silage to the beef producer varies considerably and is dependent upon a large number of other factors. If rough fodders are scarce or are high priced, if the grain is high priced, or if the grain is so near a good market that much of it can be readily sold, silage will have a greater value than if the opposite conditions exist. It is a great saver of grain regardless of whether it is to be fed to stock cattle or fattening cattle. It will lessen the grain feeding by practically the same amount as is contained in the silage. The value will also depend somewhat upon the kind of cattle to which it is to be fed.

If there is an abundance of rough fodders which can not be marketed, silage will not be so valuable. But in a case of this kind the silage would prove more valuable if used for the calves and pregnant cows and the coarse fodders used for the other stock.

## Silage for Fattening Animals

**S**ILAGE stands first in rank of all the roughage for finishing cattle. Formerly, during the era of cheap corn and other concentrates, little attention was given to the roughage, as it was usually considered merely a "filler" and of very little economic value in feeding.

No especial care was taken in selecting any particular kind, nor was the quality of it seriously considered. As the prices of the concentrated feedstuffs advanced, the feeder looked about for methods of cheapening the cost of producing beef and soon found this could be accomplished by using judgment in selecting his roughage with respect to the grain feed. This has continued until at the present time the roughage receives as much attention as the concentrated feed, and has been made to take the place of a large amount of the latter. The feeding of silage came into general use with the advent of expensive grain and is becoming more popular each year. With the present prices of feedstuffs there is hardly a ration used for feeding cattle which can not be cheapened by the use of this succulent feed. By combining it with other feeds the efficiency of the ration is increased to such an extent that the amount of the daily gains is invariably greater and the cost of producing a pound of gain is lessened. The heaviest daily gains are usually made during the first stage of the feeding period, and silage can then be used to advantage in large quantities with a small amount of grain, but as the feeding progresses the amount of silage should be lessened and the grain increased. In some places the price of hay and stover is so high that the greater the portion of the silage used in the ration the more profitable is the feeding.

Conditions in general are such that any given ration will not suit a large number of farmers, nor will it be so profitable for some as it will for others, so each farmer must determine for himself just what combination of feeds will be most profitable for his use.

Rations suitable for Florida where cottonseed meal is of moderate price and cowpea and other hays are raised on the farm:

- 1.—Corn silage, 35 pounds; cowpea hay, 8 pounds; cottonseed meal or oil meal, 7 pounds.
- 2.—Corn silage, 30 pounds; cottonseed hulls, 12 pounds; cottonseed meal, 7 pounds.

## Silage for the Breeding Herd

FOR wintering the entire breeding herd there is no roughage better than silage. All of the animals will relish a ration containing it and it will create a good appetite for all other feeds. Cows that are fed all of the silage they will consume along with clover hay will go through the winter in fine shape and make small gains. If the amount of silage is limited, a more economical method of wintering them will be to reduce the silage to a half ration, letting them have the run of a straw stack, and feeding about 2 pounds of cottonseed meal or oil meal per day. Some dry coarse fodder or straw should always be kept before animals getting silage as it reduces the amount of silage consumed and prevents the bowels from becoming too loose. The succulent feed will cause the breeding cows to give a good flow of milk even though the calf be born in midwinter, and a thrifty calf will result. If the silage is free from mold or rotten spots there will be no danger in feeding it to breeding cows.

Silage is especially beneficial for calves which have just been weaned. They take to this ration quicker than to dry feed and there is usually little loss in weight from the weaning. The silage should be supplemented with good leguminous hay, as alfalfa, cowpea, or clover, and the calves should be given a small amount of grain. A mixture of one-half corn chop and one-half cottonseed meal is excellent.

## Silage for Stock Cattle

EACH farmer will have to plan the rations for his cattle according to the amount of the various feeds he has on hand. Stockers can be wintered on silage and some good hay, fodder, or straw, but this may not always be the most profitable. When hay is high priced and grain is reasonably cheap or plenty of silage is available, it may be more economical to omit the hay altogether. A ration of corn silage alone has often been profitable for thin cattle. Stockers which have been fed liberally all winter and made to put on good gains usually do not make as large daily gains when put on grass

as do steers which have not been quite so well fed. The time the cattle are to be finished for market and the degree of fatness to be attained should govern to a large extent the method to be followed during the winter. When beeves are expected to sell high in the early summer and the steers are to be finished for market at that time, a heavy roughage ration with a small amount of grain should be fed during the winter months.

## Silage for Sheep

**T**HE use of this succulent feed for sheep has attracted the attention of most farmers only during the past few years.

Although a few sheepmen fed silage many years ago with good results, most flock-masters have been slow in giving it a trial. Owing to the wonderful increase in the use of silos on farms, and owing to the cheapness of silage as compared with other succulent feeds, such as roots, farmers are constantly raising the question regarding the feeding of silage to sheep. A great deal has been said of its bad effects upon sheep, but these have arisen either because an inferior quality of silage was fed or on account of carelessness on the part of the feeder in not feeding it properly.

A good quality of silage is extremely palatable and can be fed to all classes of sheep with good results. It must be borne in mind, however, that silage which is either very sour, moldy, or frozen should not be fed.

The amount of silage reported in feeding trials varies from 1 to 5 pounds per head per day. The amount to feed depends upon the class of sheep and the character of the other feeds comprising the ration. As a general rule from 2 to 4 pounds per head per day is considered as much as should be fed.

Lamb feeders have found silage a very satisfactory feed, and the amount fed ranges from 1 to 3 pounds per day. Where lambs are on full feed of grain, such as corn, and are receiving a fair allowance of hay, they will, as a rule, only consume from 1 to 2 pounds per head per day.

In feeding breeding ewes before lambing a daily allowance of from 2 to 3 pounds should be considered a maximum quantity. After lambing the amount can be slightly increased.

In feeding silage or any other succulent feeds it must be borne in mind that the value of such feeds to a large extent is to act as an appetizer and to keep the digestive system in good condition. Under ordinary conditions where silage is fed it should not constitute more than one-half of the entire ration, and it should be fed with other feeds that will properly balance the ration for the purpose intended.

## How to Improve Florida Live Stock

1. Do not use a scrub sire, or a mixture of two or more breeds.
2. Do not overcrowd the summer range.
3. Do not expect your live stock to obtain a good living on the open range or among the pine trees during the winter months.
4. Do not select the sire from within the herd. Introduce a sire that will infuse new blood.
5. Do not use a sire that is no better than the one discarded.
6. Good blood improves the quality; good feed also does its part; but a combination of good blood and good feed will work wonders in the improvement of our Florida live stock.
7. The native Florida live stock make a good foundation. All that is necessary is the use of good sires. Two successive crosses on the native stock, when the animals are properly fed, will make a wonderful change in both size and quality.

By using scrub sires or sires of no particular breed, or of a mixture of two or more breeds, there can be no uniformity in the herd. For instance, if a Hereford sire be used for a year or two, for the next year an Angus sire, and perhaps the following year a Shorthorn sire, what is the result? We will have cattle of all sizes, and of all colors from white to black. There will be little uniformity in either size, shape or color; although all sires used are of the beef breeds. If, as it often happens, a sire of some one of the dairy breeds be introduced in a beef herd, the injury sustained can only be reckoned by the number of females in the herd. The larger the number of breeding cows in the herd, the greater the loss. Each producer of live stock should have a fixed standard by which to gauge the quality of all his breeding stock, whether horses, cattle, sheep, swine or poultry. He should take pride enough in his business to see to it that this standard is maintained. A well matched span of horses or mules always sells for a better price than a pair which are of broken color. A carload of cattle of uniform color make a better appearance, and as a rule the buyer will take the uniform color load in preference to a better load of cattle that are mixed in color.

We find that the native stock, or stock of no particular breed, are as a rule from 40 to 50 per cent smaller than the improved breeds. This is due to several causes. As a rule, the native cattle receive but little attention. They are expected to hunt for their own living both summer and winter. If they are not able to do this they are not wanted, and the buzzards get them. The result is that during that period of the year when there is a scarcity of food the animals are starved. This means a checking of growth and development, which can not be outgrown. A runty pig always develops into a runty hog. This we can overcome by supplying an abundance of good nutritious food during the season of the year when pasturage is short.

Native stock generally run at large and breed at will. This has a tendency to reduce the size. Breeding the females when too young will also reduce the size. More or less inbreeding is sure to take place when running at large. These causes all have a strong tendency to reduce the size, quality and uniformity of the herd.

If the live stock producer is not interested enough in his stock to give them good care, such as providing them with plenty of food during the winter season or at any time when feed is scarce, it will be more profitable for him to continue to produce the native unimproved stock. To produce the best results with the improved breeds requires good attention, and if this is not given they will not be found profitable.

## Why Florida Is Not Yet a Dairy State

SINCE Florida imports dairy products to the value of thousands of dollars every year, it has so often occurred to the writer to inquire why a larger percentage of these products were not produced at home. The climate of Florida is in fact better suited to dairy work than that of several of the Northern States. Feeds should cost no more here than in the North. Yet, in spite of this, the dairy farmers of Wisconsin, Michigan and Illinois find a ready market in Florida for their condensed milk, butter, and cheese.

Here is, I think, the secret of the whole business. Florida farmers have not got the cows. I do not mean that there are no cows in Florida, but that there are not nearly enough profitable dairy cows in the state. Every dairyman should realize sooner or later, and better sooner, that every cow is not an economical milk and butter producer. Some cows will produce only 3,000 to 4,000 pounds of milk during the year, while others will produce 8,000 to 10,000 pounds in the same time. The heaviest milk producers go far beyond these figures; for instance, Colanthe 4th's Johanna (bred and owned by W. J. Gillette, Rosedale, Wis.) in twelve months produced 27,432 pounds (3,189 gallons) of milk. This cow is a pure-bred Holstein. A Jersey cow, Jacoba Irene (owned by A. O. Auten, of Jerseyville, Ill.) produced, in twelve months, 17,253 pounds (2,006 gallons) of milk. These few records will show what is possible with good dairy cows. The Holstein cow mentioned above produced as much milk in a year as six ordinary cows, while the feed consumed was perhaps equal to about what two ordinary cows would need.

The Jersey cow, Jacoba Irene, which produced 17,253 pounds of milk in a year, consumed \$96.43 worth of feed. This amount is perhaps equal to what two of our ordinary cows will eat in the same period. The milk she produced (2,006 gallons), at 30 cents per gallon, is worth \$601.80, six times the cost of the feed. The writer is well aware that such cows are not found every day, but these results show what is possible, with proper breeding and feeding.

Perhaps the average milk production per year per cow for Florida is less than 3,000 pounds of milk. With such small yields is it any wonder that dairying is not profitable? It should be the ambition of every shrewd dairyman to increase the average milk flow of each animal to the limit. He should not be satisfied with less than 6,000 pounds of milk per year from each and every cow in his herd. The reason Florida is not a great dairying state is because there are too many so-called dairy cows in the state that do not produce enough milk to pay for the feed they eat.

## Possibilities In Dairying

THERE is more in farming than the single problem of seeing how large a crop can be harvested from an acre of ground. Every bale of cotton, every ton of corn, every carload of cantaloupes takes from the soil a large amount of plant food or soil fertility. For instance, when the cotton farmer sells a ton of seed cotton, for which he obtains about \$120, he at the same time sells from his farm \$12 to \$15 worth of fertility. But the dairyman, when he sells a ton of butter, worth \$500 or \$600, sells from his farm only about 50 cents worth of fertility. While the dairyman is producing the ton of butter his animals have produced 15 or 20 tons of good fertilizer, worth altogether \$30 or \$40. The cotton grower who sells his seed cotton returns no fertility to his fields, but his crop has robbed his soil at the rate of \$12 to \$15 for every ton of seed cotton which leaves his farm. This is of importance to Florida farmers, since they probably use more commercial fertilizer per cultivated acre than do the farmers of any other state. The evidence is plain, and the reader may draw his own conclusion as to which is the most profitable system of farming in the long run—dairying which enriches, or the one-crop system which exhausts the soil.

## Balanced Rations for Dairy Cows

IN THE lists of rations given below home-grown feeds are separate from purchased feeds. The amount given in each ration is sufficient for one day's feed for a cow weighing 1,000 pounds and giving about three gallons of milk per day. (Dairy cows in Florida usually weigh from 600 to 800 pounds.) For cows giving a heavier flow of milk, it will be necessary to increase the amounts of feed accordingly. No attempt has been made to estimate the cost of these rations, or to say which will be the cheapest, as the prices of feeds vary in different places. The amounts of each feed being given, it will be an easy matter for the dairyman to calculate the local cost of the different rations and in this way find out which will be the cheapest for him to use.

#### Rations of home-grown feeds:

- 1.—Velvet beans in the pod, 10 pounds; Japanese cane, cured in shock, 10 pounds; cowpea hay, 8 pounds.
- 2.—Velvet beans in the pod, 10 pounds; cottonseed meal, 2 pounds; Japanese cane, 12 pounds.
- 3.—Velvet beans in the pod, 8 pounds; cowpea hay, 10 pounds; Japanese cane, 10 pounds.
- 4.—Corn, 3 pounds; velvet beans in the pod, 7 pounds; cowpea hay, 9 pounds; Japanese cane silage, 20 pounds.
- 5.—Velvet beans in the pod, 8 pounds; cowpea hay, 10 pounds; sorghum, green, 20 pounds.
- 6.—Velvet beans in the pod, 8 pounds; cowpea hay, 8 pounds; crabgrass hay, 8 pounds; sweet potatoes (or cassava), 25 pounds.

The above are well-known home-grown feeds, or feeds that can be grown at home. Feeds can be grown more cheaply than they can be bought on the market. In these rations, cowpea hay can be replaced by an equal weight of beggarweed hay, velvet bean hay, or any other good legume hay. Which of these hays should be used will depend largely on the cost of the hay on the market, or rather on what it will cost to produce it. One may be so situated as to be able to grow beggarweed hay, or velvet bean hay, to better advantage than cowpea hay. All of the hays in these rations are considered to be of good quality, cut at the proper stage of maturity, and properly cured.

#### Rations of purchased feeds:

- 1.—Alfalfa hay, 10 pounds; wheat bran,  $4\frac{1}{2}$  pounds; shorts,  $4\frac{1}{2}$  pounds.
- 2.—Alfalfa hay, 10 pounds; wheat bran, 9 pounds; crabgrass hay, 13 pounds.
- 3.—Alfalfa hay, 10 pounds; shorts, 9 pounds; crabgrass hay, 13 pounds.
- 4.—Alfalfa hay, 10 pounds; wheat bran, 6 pounds; beet pulp, 10 pounds.
- 5.—Wheat bran, 9 pounds; cottonseed meal, 3 pounds; cottonseed hulls, 20 pounds.
- 6.—Shorts, 8 pounds; cottonseed meal,  $2\frac{1}{2}$  pounds; hay (any non-legume), 15 pounds.
- 7.—Wheat bran, 6 pounds; cottonseed meal,  $2\frac{1}{2}$  pounds; beet pulp, 10 pounds; timothy hay, 7 pounds.
- 8.—Wheat bran, 9 pounds; cottonseed meal, 3 pounds; Japanese cane, 15 pounds.
- 9.—Corn, 5 pounds; cottonseed meal,  $2\frac{1}{2}$  pounds; cowpea hay, 12 pounds; silage, 30 pounds.

It should be understood that the above rations are not necessary to be fed in the exact quantities given above, but should be modified to suit local conditions or the actual conditions on each farm. They are given to show approximately the average amounts and character of feed that would be consumed daily by a 1,000-pound steer during the feeding period.

It is well to feed as near a balanced ration as possible without materially increasing its cost. Sometimes the prices of available feeds are such that a farmer is justified in deviating from the standard. Such conditions are illustrated by the use of some of the rations given above. The second ration shown for the south is an example, as that ration is very narrow, but in certain localities it is more profitable than one which is balanced by the use of high-priced carbohydrate feeds.

Two rations are shown for the west where kaffir-corn silage is used. With some farmers it would undoubtedly be more profitable to use alfalfa hay as a substitute for cottonseed meal, while with others the purchase of the cottonseed meal would be more economical.

## Miscellaneous Considerations

**S**ILAGE is a quick finishing roughage in that it produces large daily gains and produces a glossy coat and a soft, pliable skin. Moreover, it can be used to advantage at times for carrying cattle for a longer time so as to pass over a period of depression in the market, or to carry the cattle along in thrifty condition so they they can be finished at a later period.

For many years the belief was general that cattle which received silage as a major portion of the roughage would have to be kept in warm barns and not be exposed to the cold. While they do need protection from the cold winds and rains and need a dry place to lie down, it has been clearly demonstrated that warm barns are not only unnecessary but that fattened cattle make both larger and cheaper gains when fed in the open sheds than when confined in barns. Stocker or thin cattle receiving silage will of course need more protection than animals which are being fattened.

Silage can be profitably used to supplement the pastures for steers during a time of drought, when they are being finished for market, but it is still an open question whether it can always be used profitably for feeding to breeding cattle during such times.

The theory that silage-fed cattle shrink very heavily in shipping to market is erroneous. While the actual shrinkage during transit is sometimes greater, the fill taken at market is usually good, and if good judgment is used in preparing them for shipping the net shrinkage is no greater than for cattle which have been fed on dry feeds. For thirty-six hours previous to shipping nice bright hay and stover should be substituted for the silage in the ration.

The general impression that choice or prime carcasses can not be made by the use of succulent feed is equally untrue, as the silage-fed cattle usually make more desirable carcasses than cattle fed a similar ration, except that silage was replaced by one of the coarse fodders. There is no appreciable difference in the percentage of marketable meat that steers will dress out which have been finished on a silage ration and a dry ration. The meat seems equally bright and the fat as well intermixed with the lean.

If silage makes up the bulk of the roughage it will be necessary to haul large amounts of bedding into the sheds to keep the animals dry, as there is no waste in silage, or else make a cement floor and cover with bedding to absorb the urine and prevent the animals from slipping and to give them a warm place to lie down. When the enormous saving in the quality and amount of the feed is considered, this disadvantage does not seem so hard to overcome by the stockman who has the capital to put up the silo and pave his feed sheds or feed lots.

## Crops for Hogs

**T**O produce pork at a profit requires that hogs must be fed largely on green forage crops from weaning time until ready for market. Of course, along with these green forage crops, there must be given a liberal allowance of grain. It has been proved many times that when hogs are supplied with green feed in addition to their grain ration they make a more rapid growth. This means that pork is produced at less cost per pound.

With our mild climate, it is possible to grow green pasture or soiling crops for hogs at all times of the year. However, to do this successfully the farmer must give some thought and consideration to his cropping rotation. To be able to grow these crops at proper times, it will be necessary to plan a rotation about a year in advance. If the rotation is not planned out ahead, the chances are that the hogs will run short on green feed just when they need it most.

One of the common questions asked is, for how many hogs will one acre of land supply feed? This is a difficult question to answer, for the reason that soils vary in different localities. Climatic conditions are such sometimes that a good crop is not produced. The seed used may be of a poor quality, and as a result a poor stand obtained, which means that only a partial crop is produced. There are a number of factors that may influence the yield of the crop, hence it is impossible to say just how many hogs one acre of a given crop will supply feed for. We can generally depend on feeding six to ten hogs per acre of good land.

There are a number of reasons why the growing of hogs here in Florida ought to be a satisfactory business proposition. Plenty of green forage crops and grain crops can be produced with which to feed them. There is a good market at home for all hog products.

The price paid by the local markets is quite satisfactory. The Florida markets demand a small hog, one that will dress from 75 to 125 pounds. All successful hog raisers know that it is much cheaper to produce two hogs that will dress 100 pounds each, than it is to produce one hog that will dress 200 pounds. In our mild climate it is not necessary to invest a large amount of capital in barns and sheds for shelter. Thus the cost of production is further reduced.

The following crops will supply green pasture the year round if planted at the season of the year indicated: Cowpeas and sorghum can be planted any time from the latter part of February until August. Cowpeas planted the latter part of February will be ready to pasture by April 1st to 15th. Sorghum planted in February will be ready to pasture early in May. If these crops are planted at intervals of two or three weeks, good pasturage can be obtained from early spring until frost in the fall.

Two varieties of cowpeas that are well suited to Florida conditions are Brabham and Iron. Good varieties of sorghum are Sumac, Orange, and Gooseneck. For an early maturing variety, the Early Amber sorghum is satisfactory.

The best results will be obtained if these crops be planted separately. It will also be found best to plant in rows and give some cultivation. A larger yield will be obtained than if sown broadcast.

Dwarf Essex rape is an excellent pasture crop for hogs. This is a crop that will produce an abundance of good pasturage from November until March. The habit and nature of the crop is such that it grows best in Florida during the winter season. Dwarf Essex rape, planted the latter part of September or early in October, will be ready for pasture in from eight to ten weeks after planting. This crop is easily grown. It will stand several degrees of frost, and supplies an abundance of nutritious grazing. Plant the seed in rows. Make the rows from two to three feet apart. Drill in the seed at the rate of three to five pounds per acre.

Other good pasture crops for winter grazing are oats, barley, and rye. These crops should be sown during the latter part of October or early in November. In addition to these crops, it is desirable to have Bermuda grass as a permanent pasture.

The farmer who plants these crops on good land and gives them due attention will have good hog pasture every month in the year. Crops that should and can be grown for fattening hogs are corn and sorghum, as grain crops, and sweet potatoes, chufas, and peanuts. The expense of harvesting crops to feed hogs is no small item. This should be kept in mind, and such crops grown as can be harvested by the hogs themselves. By doing this the expense of pork production will be reduced to the minimum.

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